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OILFIELD RESEARCH LABORATORIES

P. O. BOX 647 - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

February 16, 1984

Jackson Brothers
514 North Main
Eureka, Kansas 67045

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Tom Edwards Lease, Well No. 4, located in Greenwood County, Kansas and submitted to our laboratory on February 12, 1984.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

BRP/ph

5 c to Eureka, Kansas

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GENERAL INFORMATION & SUMMARY

Company Jackson Brothers Lease Tom Edwards Well No. 4

Location 330' FSL & 2310' FEL

Section 7 Twp. 23S Rge. 11E County Greenwood State Kansas

Elevation, Feet	
Name of Sand	Bartlesville
Top of Core	2090.0
Bottom of Core	2110.3
Top of Sand	2090.0
Bottom of Sand	2098.3
Total Feet of Permeable Sand	8.3
Total Feet of Floodable Sand	7.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
7 - 9	2.0	2.0
22 - 25	3.0	5.0
35 - 40	2.3	7.3
144 - 146	1.0	8.3

Average Permeability Millidarcys	37.9
Average Percent Porosity	17.7
Average Percent Oil Saturation	36.1
Average Percent Water Saturation	38.2
Average Oil Content, Bbls./A. Ft.	491.
Total Oil Content, Bbls./Acre	4,076.
Average Percent Oil Recovery by Laboratory Flooding Tests	8.9
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	117.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	819.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section

The core was sampled by a representative of Oilfield Research Laboratories. Fresh water mud was used as a drilling fluid. The core was reported to be from a non-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
2090.0 - 2094.0	Brown sandstone.
2094.0 - 2095.0	Brown slightly shaly sandstone.
2095.0 - 2096.0	Brown sandstone.
2096.0 - 2097.0	Brown slightly shaly sandstone with scattered gray shale inclusions.
2097.0 - 2098.3	Brown sandstone with scattered carbonaceous inclusions.
2098.3 - 2110.3	Gray shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 819 barrels of oil per acre was obtained from 7.0 feet of sand. The weighted average percent oil saturation was reduced from 35.5 to 26.6, or represents an average recovery of 8.9 percent. The weighted average effective permeability of the samples is 6.58 millidarcys, while the average initial fluid production pressure is 23.6 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 8 samples tested, 7 produced water and oil. This indicates that approximately 88 percent of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 1,570 barrels of oil per acre. This is an average recovery of 224 barrels per acre foot from 7.0 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor, estimated	1.17
Reservoir water saturation, percent, estimated	30.0
Average porosity, percent	17.4
Oil saturation after flooding, percent	26.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	7.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Brothers Lease Tom Edwards Well No. 4

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	2090.5	16.0	35	54	89	434	22.	1.0	1.0	434	22.00
2	2091.5	17.7	31	39	70	426	24.	1.0	2.0	426	24.00
3	2092.7	20.4	34	33	67	538	22.	1.0	3.0	538	22.00
4	2093.4	14.6	45	41	86	510	145.	1.0	4.0	510	145.00
5	2094.5	18.2	32	38	70	452	8.2	1.0	5.0	452	8.20
6	2095.6	16.2	43	27	70	540	35.	1.0	6.0	540	35.00
7	2096.5	19.6	28	34	62	426	7.8	1.0	7.0	426	7.80
8	2097.5	18.6	40	39	79	577	39.	1.3	8.3	750	50.70

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Brothers Lease Tom Edwards Well No. 4

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
2090.0 - 2098.3	8.3	37.9	314.70

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
2090.0 - 2098.3	8.3	17.7	36.1	38.2	491	4,076

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Brothers Lease Tom Edwards Well No. 4

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	2090.5	16.5	35	448	11	141	24	67	307	28	0.75	30
2	2091.5	17.2	31	414	5	67	26	72	347	258	12.42	10
3	2092.7	19.9	34	525	10	154	24	60	371	94	2.10	25
4	2093.4	15.1	45	527	9	105	36	63	422	312	22.99	10
5	2094.5	18.0	32	447	9	126	23	63	321	52	1.05	30
6	2095.6	15.8	43	527	16	196	27	55	331	290	6.60	20
7	2096.5	19.2	28	417	2	30	26	60	387	8	0.15	40
8	2097.5	18.7	39	566	0	0	39	40	566	0	Imp.	-

Notes: cc—cubic centimeter.

*—Volume of water recovered at the time of maximum oil recovery.

**—Determined by passing water through sample which still contains residual oil.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Jackson Brothers Lease Tom Edwards Well No. 4

Depth Interval, Feet	2090.0 - 2098.3
Feet of Core Analyzed	7.0
Average Percent Porosity	17.4
Average Percent Original Oil Saturation	35.5
Average Percent Oil Recovery	8.9
Average Percent Residual Oil Saturation	26.6
Average Percent Residual Water Saturation	62.9
Average Percent Total Residual Fluid Saturation	89.5
Average Original Oil Content, Bbls./A. Ft.	472.
Average Oil Recovery, Bbls./A. Ft.	117.
Average Residual Oil Content, Bbls./A. Ft.	355.
Total Original Oil Content, Bbls./Acre	3,305.
Total Oil Recovery, Bbls./Acre	819.
Total Residual Oil Content, Bbls./Acre	2,486.
Average Effective Permeability, Millidarcys	6.58
Average Initial Fluid Production Pressure, p.s.i.	23.6

NOTE: Only those samples which recovered oil were used in calculating the above averages.

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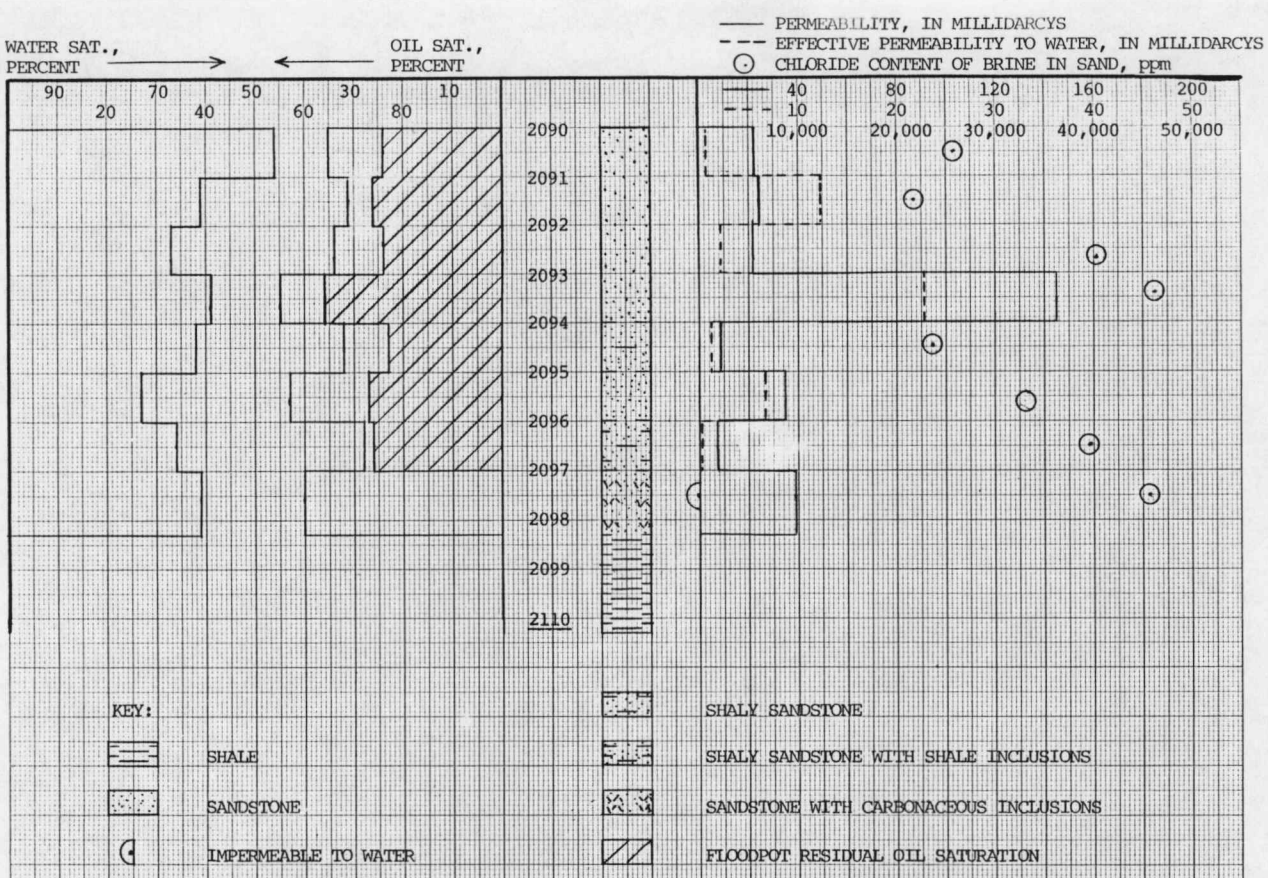
RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Jackson Brothers Lease Tom Edwards Well No. 4

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
1	2090.5	25,814			
2	2091.5	21,521			
3	2092.7	40,119			
4	2093.4	46,414			
5	2094.5	23,564			
6	2095.6	33,164			
7	2096.5	39,527			
8	2097.5	45,510			

Note: ppm — parts per million



JACKSON BROTHERS

TOM EDWARDS LEASE — WELL NO. 4

GREENWOOD COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLS. / ACRE
2090.0 - 2098.3	8.3	17.7	36.1	38.2	37.9	1570 (PRIMARY AND WATERFLOODING)

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CHANUTE, KANSAS
FEBRUARY, 1984 RAL